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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/307,988	05/10/1999	WILLIAM B. TELFAIR	VISX0011U/US	5573

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NEIFELD IP LAW, PC
4813-B EISENHOWER AVENUE
ALEXANDRIA, VA 22304

EXAMINER	
SHAY, DAVID M	

ART UNIT	PAPER NUMBER
3735	

NOTIFICATION DATE	DELIVERY MODE
08/22/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

general@neifeld.com
rneifeld@neifeld.com
rhahl@neifeld.com

Office Action Summary	Application No.	Applicant(s)	
	09/307,988	TELFAIR ET AL.	
	Examiner	Art Unit	
	david shay	3735	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *May 1, 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *61-84 and 90-96* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *61-84 and 90-96* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *June 11, 2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The examiner acknowledges applicant's amendment to the specification, however, as a restriction requirement was made on October 9, 1998, in the parent case, U.S. Patent Application No. 08/816,097, between the method and apparatus claims, and wherein the apparatus claims were elected in the response filed November 9, 1998, and prosecuted therein, with the method claims being withdrawn, and as the instant case was filed with a pre-amendment, which was filed on even date therewith, which pre-amendment cancelled all the apparatus claims, leaving only method claims pending, and which pre-amendment has stated thereon "Serial No: NOT ASSIGNED (Divisional of U.S. Appl. No.: 08/816,097); the instant case is clearly a Divisional of U.S. Patent Application No. 08/816,097 and not a Continuation thereof. Therefore, the continuation data set forth in the amendment filed May 1, 2008 is erroneous and must be corrected.

With regard to the art rejections, applicant asserts that the rejections of the claims are improper because "no facts suggest an idler beam pulse having a wavelength of between about 2.75 and about 3.0 microns as defined by independent claims 61 and 90, or an idler beam pulse wavelength of between 2.9 and 3.0 microns as defined by independent claim 80". Particularly, applicant notes that Lin teaches a mid IR (2.5-3.0 microns) laser generated from optical parametric oscillation (OPO) using a near-IR laser (such as Nd:YAG or Nd:YLF, flash lamp or diode pumped) as the pumping sources and a KTP or BBO as the frequency conversion crystals" applicant also reproduces claim 18, for reasons which are not clear., and notes that Lin is silent regarding phase matching. Applicant then alleges that "Lin does not enable an OPO laser system for wavelengths in the 2.75 to 3.0 micron range", pointing to an article published about 4 years prior to the filing date of Lin. Thus the lack of production of wavelengths in the 2.5 to 3.0

micron range by Lin the referenced article does not show that these wavelengths were not able to be produced by one of ordinary skill in the art at the time the Lin patent was filed, four years later. However, the fact that Lin specifically claims performing corneal refractive surgery with "an OPO mid-IR laser having an output of 2.5 to 3.5 microns" (see Lin, claim 10), is strong evidence that one of ordinary skill in the art was enabled to produce these wavelengths using an OPO at the time of the invention of Lin, due to the presumption of validity afforded issued U.S. Patents. Thus these arguments are not convincing.

Turning to the Tang et al reference, applicants theorize that "the experimental data points are for data obtained near the theoretical predictions for the threshold pump power and threshold intensity" would indicate "the criticality of that pair of values" but fails to tie the theorized "criticality" with any other point in the argument. Applicant continues to theorize that since the data points on the graph only show a few degrees that these are the only points at which the OPO output. However, applicant offers not factual basis for this. The lack of other data points could have been for any number of reasons: (1) failure of the pump laser; (2) need for maintenance of the pump laser; (3) the amount of time the equipment, lab, or the researchers themselves were available for the experiment; (4) jamming or other malfunction of the mechanism used to adjust the angle theta; etc. Applicant then supposes that since the signal beam conversion efficiency is discussed, that the idler beam conversion efficiency must be less, providing no real rational for this conclusion. Next applicant postulates that since Tang et al discuss no pump power greater than 5 mj, and alleges that this indicates that higher powers would have damaged Tang's optics, when in reality it can readily be seen from the discussion at line 3, in the third column and the that this was the maximum power available from the pump laser they were using which produced

350 kW peak power (see the last three lines in column 2). Finally applicant concludes that, based on the otherwise unsupported musings set forth above, that one of ordinary skill in the art would have concluded that the idler pulse would have had an energy of less than 1 mj at the 269 micron wavelength. However, applicant does not even bother to provide any sort of rational for this conclusion, and the examiner can see none, even if the unproven suppositions set forth above were indeed correct (and the examiner has seen no evidence that they are correct). Equally unfounded is the ensuing statement that "one of ordinary skill in the laser arts would have *known* (1) that the idler pulse energy would fall to zero as θ was increased to 65 or 66 degrees, by visual extrapolation of the data in figure 1a and (2) that the idler beam wavelength from 2.69 to about 2.8" (italics added, underlining in original), however, as this statement drawn to the non-critically phase matched laser system (see the last full sentence on page 8 of the instant response), and since the article to Tang et al is drawn to a critically phase matched laser system as well, to which these unfounded assertions do not apply.

Therefore, the examiner cannot share applicant's conclusion "that there would be no motivation to use a system limited…" as this conclusion is base on very few facts strung together with an extensive network of supposition, presumption, and guesses.

Now applicant turns to the combination, however, since the arguments against the combination are all based on the same dubious conclusions asserted by applicant previously with regard to the two references, they are no more convincing now than they were applied to the references separately.

With regard to claims 66 and 76, applicant asserts that the "reference does not suggest selecting the critical range of 10-50 Hz". However, as Davenport et al expressly teach e.g. 20 Hz

(which is within the so-called "critical range") this argument is not convincing. Since Tang et al teaches a beam diameter of "*on the order of* one to five millimeters" (emphasis added) there is no need for Davenport et al to supply this teaching as well.

With regard to the rejection of claims 64 and 65, applicant argues that there is no reason to combine the teachings since Anthon desires to minimize noise. However, in a medical laser method for operating on tissues as delicate as the eye, it is very important to have a stable laser – a poor signal can always be resent, however, a mistaken ablation of the eye cannot be so easily remedied. Thus this argument is not convincing.

With regard to the rejection of claim 82, the examiner firstly notes that applicant's additions to the motivational statement alter the meaning thereof to one not contemplated by the examiner. The examiner has never stated that the wavelength between about 2.9 to 3.0 microns is not critical, this wavelength is highly desirable for many surgical purposes, including eye surgery, as taught by Lin et al, it is the particular non-linear material to produce the wavelength that is not critical, as other materials are also available. Further, with regard to Bosenberg et al, applicant alleges that the reference "is insufficient to provide a reasonable expectation of success either in achieving lasing or performing surgery with laser light in the 2.75-3.0 micron range". However, applicant appears to have forgotten that Bosenberg et al is part of a combination including Lin, which already teaches and claims performing surgery with (and thus achieving lasing with) an OPO with an output beam in this range. Further, Bosenberg et al expressly state that the "high gain of PPLN has allowed OPOs to be operated at ~25 times above oscillation threshold without damage….quasi phase matched period was varied over 26-32 μm

achieving a tuning range of 1.35-4.9 μm" (emphasis added), thus the wavelengths were not suggested to calculated, but actually achieved. Thus applicant's arguments are not persuasive.

Regarding the rejection of claims 83 and 84, applicant's arguments are essentially the same as those for claim 82, except the deficiencies attributed to Boenberg et al above are here attributed to Rhines et al. These arguments are no more persuasive here than when they were set forth above.

As to the arguments regarding the rejection of claim 81, these are somewhat unclear to the examiner. Apparently, applicant appears to believe that the examiner believes that the 2.94 μm wavelength is not critical. Firstly, as set forth above, the examiner has never stated that the 2.94 μm is not critical. There is no reason to do this since (1) this particular wavelength is nowhere claimed, although it is contained in all the claimed ranges and (2) Lin already teaches the desirability of using this particular wavelength, as well as the rest of the wavelengths in the claimed ranges.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 61-63, 67-80, and 90-96 are rejected under 35 U.S.C. 103(a) as being unpatentable over in Lin in combination with Tang et al. Lin teaches performing corneal sculpting with radiation in the 2.5-3.2 micron range generated by an OPO with pulse width in the 1-40 nsec range. Tang et al teach producing radiation in the range of Lin using a CPM KTP OPO pumped at about 1 micron, the pump thresholds are discussed as 0.5 mJ corresponding to 30 KW power and 17 MW/cm^2. To produce 0.5 mJ with a 30 KW pulse requires a pulsed width of 17 nanoseconds to produce a power density of 17 MW/cm^2 with 30 KW pulse yields

(assuming a circular beam cross section) a beam radius of 562 microns, which is well in excess of eight times the diffraction limit of a multi-mode beam. It would have been obvious to the artisan of ordinary skill to employ the OPO of Tang et al in the method of Lin, since this enables effective tuning in the desired range as taught by Tang et al; to employ a mirror that tramsits the pump pulse at a forty five degree angle thereto since the does not manipulatively affect the method and is notorious in the art as has been previously set forth; to tune the output to be in the 2.75-3.0 micron range, since Lin gives no indication that this portion of Lin's range should be avoided, since the claimed range is not critical, and since the wavelengths near 3 microns are notoriously useful for surgery, because they are highly absorbed by water – a major component of tissue, official notice of which has already been taken; to increase the power of the pump beam by increasing the energy of the pump, since this increases efficiency, as the power at the harmonic increases as the square of the input power official notice of which has already been taken, and to transmit pump radiation exiting the crystal to a second KTP crystal and interlace the resulting idlers, since these are equivalents, provide no unexpected result, and are known configurations in the art, official notice of which has already been taken thus producing a method such as claimed.

Claims 66 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over in Lin in combination with Tang et al, as applied to claims 61-63, 67-75, 77-80 and 90-96 and further in view of Davenport et al. Davenport et al teach that increasing the input energy increases the efficiency of the non-linear conversion and is capable of producing repetition rates in the claimed range. It would have been obvious to the artisan of ordinary skill to employ increased input energy and a repetition rate as claimed in the OPO of Tang et al in the method of Lin, since this

provides increased conversion efficiency, as taught by Davenport et al and is within the capability of lasers in the art at the time of the invention, as taught by Davenport et al, thus producing a method such as claimed.

Claims 64 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over in Lin in combination with Tang et al as applied to claims 61-63, 65-80, and 85-96 and further in combination with Anthon. Anthon teaches the desirability of employing a multi-mode beam pump beam. It would have been obvious to the artisan of ordinary skill to employ the multi-mode beam pump beam of Anthon, since this enables suppression of stimulated Brillouian scattering (SBS), thus producing a method such as claimed.

Claims 82 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Bosenberg et al. Lin teaches a method as claimed except for the particular non-linear material. Bosenberg et al teach generating wavelengths in the range desired by Lin using the non-linear material claimed. It would have been obvious to the artisan of ordinary skill to employ an OPO using the non-linear material of Bosenberg in the method of Lin since this can produce the desired wavelengths, is not critical, provides no unexpected result, and does not manipulatively effect the method, thus producing a method such as claimed.

Claims 83 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Rines. Lin teaches a method as claimed except for the pump wavelength. Rines teaches using a Titanium Sapphire laser to pump KTP to produce mid-infrared radiation in a NCPM OPO. It would have been obvious to use the of OPO of Rines in the method of Lin, since this is not critical, provides no unexpected result, and does not manipulatively affect the method, thus producing a method such as claimed.

Claims 81 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in combination with Bosenberg et al as applied to claim 82 above, and further in view of Mead et al. Mead et al teach the equivalence of periodically poled $LiNbO_3$ and periodically poled KTP for non-linear wavelength conversion. It would have been obvious to the artisan of ordinary skill to employ periodically poled KTP in the method of Lin and Bosenberg et al, since this produces no manipulative effect and is a recognized equivalent to periodically poled $LiNb0_3$, as taught by Mead et al, thus producing a method such as claimed.

Applicant's arguments filed May 1, 2008 have been fully considered but they are not persuasive. The arguments are not persuasive for the reasons set forth above.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to david shay whose telephone number is (571) 272-4773. The examiner can normally be reached on Tuesday through Friday from 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Marmor, II, can be reached on Monday, Tuesday, Wednesday, Thursday, and Friday. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/david shay/

Primary Examiner, Art Unit 3735